

TRT-H-2R2T Slimline Touchscreen Hotel Thermostatic Controller

The TRT-H-2R2T series thermostatic controllers offer a modern flush mounted slim design look for the heating and cooling control with two control zones (main space and bathroom). The units are ideal for hotel room applications. The TRT-H-2R2T series devices have 3.5" backlit colour touchscreen. The devices have also integrated lighting and/or A/C ventilation enable control.

The MOD models have built-in Modbus RTU communications and the BAC models provide BACnet MS/TP communications.

Features

- 24Vac/dc Power Supply
- 3.5" Inch Backlit Touchscreen Display
- BACnet and Modbus Communication Models
- Main Zone Heating and/or Cooling Control via modulating 24Vac PWM output
- Second Zone Heating Control Output via 230Vac Relay (e.g. for bathroom underfloor heating) or via PWM Triac
- Flush Mounting in the UK or EURO Wall Mounting Box
- Attractive Modern Designer Look
- Built-In Temperature Sensor for Main Room Control
- Remote NTC10 Sensors for Second Zone Control (e.g. Bathroom)
- Digital Volt-Free Input e.g. for Door Card Contact
- Ventilation Enable Output, 24Vac Triac (On/Off)
- Lighting Enable Output 7A 230Vac (On/Off)
- Network Sensor Display



Ordering guide		Type	0	1	2	3	4	5	6
0	Touchscreen room thermostats	6001						0	
1	Device type	Multi-zone room thermostat, 1RI, 1DI, 2RO, 2DO	TRT-H-2R2T	4					
2	Communication	Modbus	-MOD		M				
		BACnet	-BAC		B				
3	Power supply	24 Vac/dc	-24			2			
4	Additional measurements	No additional measurement					0		
		Relative humidity	-RH				1		
5	Reserved							0	
6	Body colour	Chrome							0
		White (RAL 9010)	-W						W
		Black (RAL 8022)	-B						B

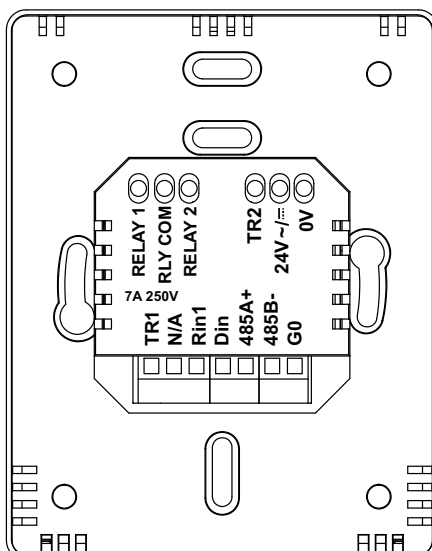
Technical Data

Power Supply	Power supply	24VAC/DC -10%/+15%
Display	Touchscreen	3.5" Backlit Touchscreen, 320 x 480 pixels, 255K colours
Signal Outputs	Digital Triac Outputs	1 x 24Vac Triac 0.5A - Main Zone Heating/Cooling 1 x 24Vac Triac 0.5A - Ventilation Enable Note: Only available with 24VAC supply.
	Relay Output	1 x 7A 230Vac Relay - Second Zone Heating (Bathroom) 1 x 7A 230Vac Relay - Lights Enable
Signal Inputs	Built-In Sensor	0..50°C (32..122°F) ±0.3°C @ 25°C
	Resistive Inputs	1 x External NTC10K3A1 Sensor; Second Zone Control
	Digital Input	1 x Digital Input, Volt-Free Contact, Impedance <1KOhm, Door Contact

Optional Humidity Sensing (RH Option)	Range	0..100%rH
	Accuracy	±2% rH (within 20..80% rh)
Communication	Modbus (-MOD models)	
	Protocol	Modbus RTU
	Interface	RS485; maximum 63 devices
	Addressing	1..247 via Touchscreen
	Communication	9k6/19k2/38k4/57k6/76k8 Baud; Parity None/Even/Odd, 1 or 2 Stop Bits (adjustable through Touchscreen)
	BACnet (-BAC models)	
	Protocol	BACnet MS/TP
	Interface	RS485; maximum 63 devices
	MAC Addressing	0.127 via Touchscreen
	Device ID	Default 651000 + MAC Address, Adjustable
Connections	Terminal Connections (Relay & Power Supply)	Solid and Stranded Cable Maximum Size: Solid; 0.05-2.5mm ² , Stranded: 0.05-1.50mm ² Rising Clamp: Size 2.5 x 2.2mm
	Terminal Connections (Low Voltage Terminals)	Solid and Stranded Cable; 90° Angle for Wiring Maximum Size: 0.05 to 1.5mm ² (EN ISO) / 14 to 30 AWG (UL) Rising Clamp: Size 2.5 x 1.9mm
	Environmental Conditions	
	Operating	Temperature 0°C...+50°C (32..122°F) Humidity 0...95%rh (non-cond.)
Standards	CE Conformity	CE Directive 2004/108/EC (EMC), 2006/95/EC (LVD) EN61000-6-3: 2001 (Generic Emission) EN61000-6-1: 2001 (Generic Immunity) EN60730-1:2016 (Low Voltage) EN6100-4-2/4/5/11 (ESD, Transient, Surges, Interruptions)
	Degree of Protection	IP20
	Housing	
Housing	Housing Material	Polycarbonate Plastics, Self Extinguishing, Black and Chrome (standard) W-Option: White Enclosure - Black Front B- Option: Black Enclosure - Black Front
	Mounting	Wall or Junction Box Mounting
	Dimensions	W88 x H112 x D43mm; Flush: W88 x H112 x D14.5mm
	Weight	220g

Wiring Connections (TRT-H-2R2T)

24V MODEL WIRING



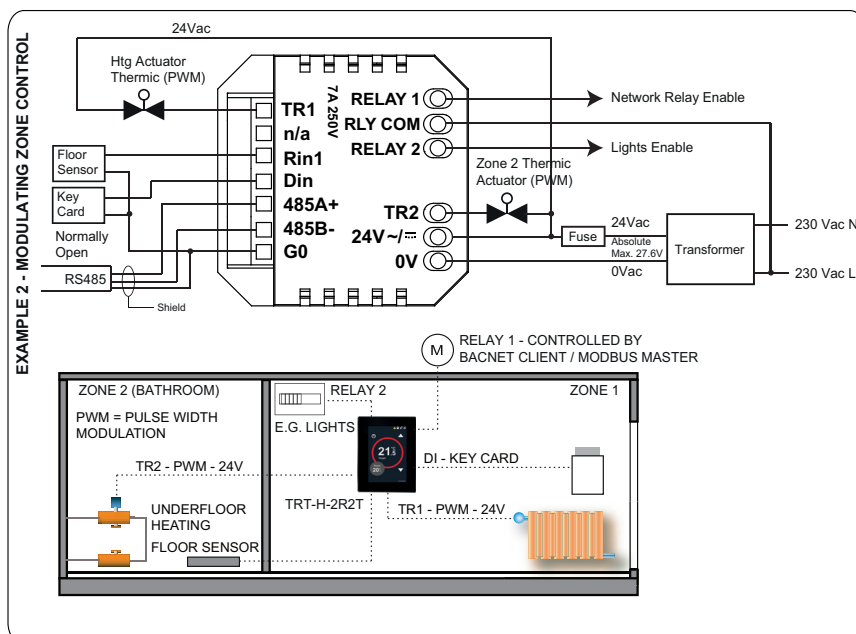
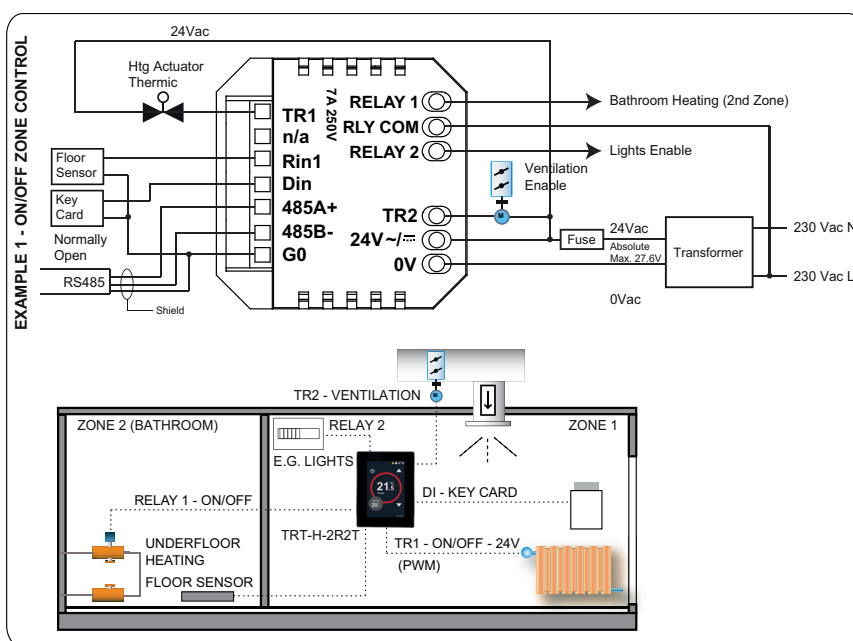
24V Model Wiring

RELAY 1	250VAC/30VDC 7A Relay Contact - Second Zone Heating
RELAY 2	250VAC/30VDC 7A Relay Contact - Lights Enable
TR2	24Vac Triac Switching to 0V - Ventilation Enable
24V	24Vac/dc Supply; Note: TR1 & TR2 Require 24Vac
0V	0V Supply
TR1	24Vac Triac Switching to 0V - Main Heating/Cooling
Rin1	Remote NTC10 Temperature Sensor Input (2nd Zone)
Din	Volt-Free Digital Input Contact (Door Contact)
485A+	Modbus / BACnet MS/TP RS485 A+ Connection
485B-	Modbus / BACnet MS/TP RS485 B- Connection
G0	0V Common

WARNING: Switch off the power before any wiring is carried out.

Application Wiring Example

The diagrams below illustrates a typical application examples of the TRT-H-2R2T thermostatic controller.



Typical TRT-H-2R2T Home Screens

The images below illustrate the typical home screens on the TRT-H-2R2T thermostatic controller. The screen is touch sensitive and shows the current status of the device. Inside the red/blue/white ring the TRT shows the current target temperature of the main control zone. The intensity of the red/blue ring changes based on the temperature differing from the target temperature.

The small circle indicates the current main zone room temperature (and if enabled the floor temperature and/or outside temperature, and/or relative humidity via a rotating transition).

In ECO Mode the home screen shows the current ECO mode target temperature, and by pressing the ECO Mode Icon, the ECO mode can be cancelled. If enabled Lights and A/C symbols indicate corresponding system status, and the devices can be switched on/off from the buttons.

HEATING DEMAND

COOLING DEMAND

ECO MODE ON

ICON DESCRIPTION

- HEATING DEMAND
- COOLING DEMAND
- AT TEMPERATURE (NO HTG/CLG)
- COMMS MESSAGE
- CLEANING MODE
- SCREEN LOCKED
- LIGHTS ON/OFF
- AIR/CON ON/OFF
- ERROR
- SCREEN DIM ICON
- MAINTENANCE MODE
- BOOST MODE
- ECO MODE
- FROST PROTECTION ACTIVE

STATUS INFORMATION BANNER

BOOST ICON IF BOOST TIME DEFINED

INTENSITY OF THE RED CHANGES DEPENDING ON DIFFERENCE BETWEEN TARGET AND ROOM, AT 2°C FULL RED

A/C AND LIGHTS STATUS AND SWITCH ON/OFF CONTROL (LIT WHEN ON)

INTENSITY OF THE BLUE CHANGES DEPENDING ON DIFFERENCE BETWEEN TARGET AND ROOM, AT 2°C FULL BLUE

PRESS DIM BUTTON TO SWITCH BACKLIGHT OFF

TRANSITIONS BETWEEN ROOM - FLOOR/OUTSIDE IF FITTED / ENABLED

THE SMALL INFO CIRCLE ACTS ALSO AS A TOUCH AREA FOR FURTHER SETTINGS

CANCEL ECO

Touchscreen

The TRT thermostatic controller home screen has a number touch sensitive areas that allow the device settings to be changed.

- UP and DOWN arrows; to alter the current main zone target temperature or humidity setpoint with RH option)
- SCREEN DIM ICON; switches the screen backlight off
- SMALL ACTION CIRCLE (that contains current main zone temperature etc.); allows access to FURTHER SETTINGS AND INFORMATION screen; password protected
- FUNCTION BASED ICON; in BOOST mode shows the BOOST icon from where the main zone output can be Boosted on; in OFF mode shows the OFF icon where the OFF mode can be cancelled
- A/C ICON; when AC is enabled the AC can be enabled/disabled from this icon
- LIGHTS ICON; when LIGHTS are enabled, the lights can be enabled/disabled from this icon
- ECO icon; when ECO mode is on, the ECO mode can be cancelled from the button

Touchscreen Backlight

The touchscreen backlight level can be adjusted through the maintenance mode. During the normal operation after 30 seconds of inactivity, the touchscreen dims to the "stand-by" level set. If the backlight level is set to 0, the screen backlight switches off.

By pressing the DIM icon when the screen is active the screen is immediately dimmed to the "stand-by" level. Pressing the DIM icon when the device is in the "stand-by level", switches the backlight OFF.

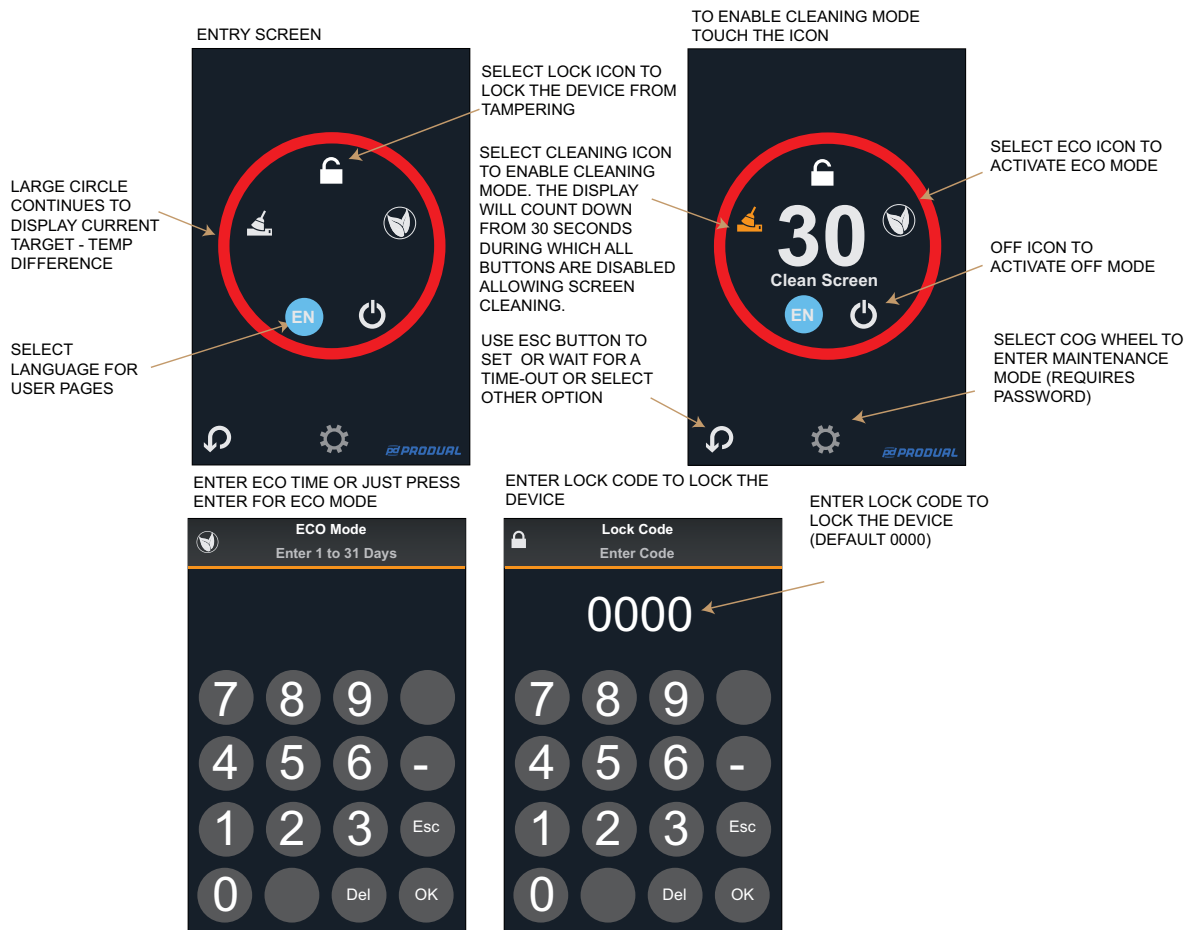
The screen backlight is automatically activated when it is touched.

Further Settings and Information

The FURTHER SETTINGS shows additional user settings options on the TRT thermostatic controllers:-

- LOCK icon is used to lock the thermostat. Number of different lock modes options exist.
- ECO icon is used to switch the thermostat to ECO mode (ECO setpoint)
- CLEANING icon is used to enable timed cleaning mode.
- COG WHEEL icon allows entry to the maintenance mode.

FURTHER SETTINGS AND INFORMATION

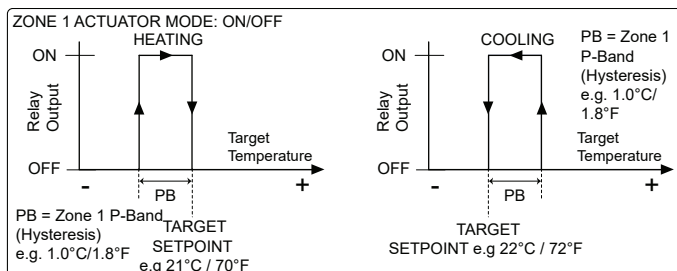


Zone 1 (Main) Temperature Control (TR1 Output / Relay1 Output)

In the ON/OFF mode, the TRT-H-2R2T controls to the Zone 1 target temperature by switching the Triac1 ON/OFF as required. It is also possible to configure Relay1 to be controlled by the Zone 1 temperature. The control logic has hysteresis i.e. in the heating mode the temperature has to drop the target setpoint the amount of hysteresis to switch the relay ON to prevent fast on/off. When the temperature reaches the Zone 1 Setpoint, the relay switches OFF. In cooling mode this operates in reverse. The diagram below illustrates the temperature control operation.

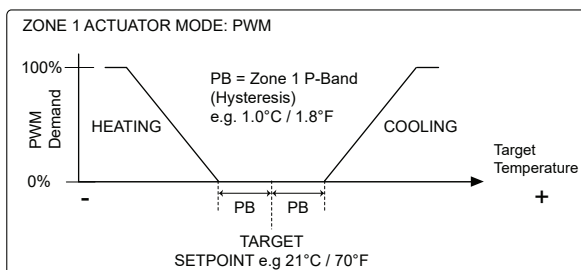
The target temperature is typically adjusted by the user by pressing UP & DOWN buttons. The target temperature is changed in different operating situations;

- COMFORT MODE; target temperature as adjusted by the user (or via the networked system) and displayed on the screen
- ECONOMY MODE; target temperature switched to the ECONOMY setpoint (activated via door card input or via the network)
- OFF MODE; the thermostat is OFF, but FROST setpoint is active protecting the building (activated via network or door card input for unoccupied periods)



Note: ECO to COMFORT transition retains the user set target temperature. OFF to COMFORT transition resets the user adjustment, and sets the target temperature to the Zone 1 Setpoint.

The triac output TR1 can also be configured to operate in PWM mode (pulse width modulation) mode. In the PWM mode the triac output is modulated on/off based on the control demand using the pulse period. E.g. if the pulse period is 30 seconds and the PWM control demand is 40%, the output is 12 seconds ON and 18 seconds off to achieve the required valve position. The PWM mode can operate in P or PI-control modes to calculate the required demand (Proportional + Integral Control).



Zone 2 Control (e.g. Bathroom)

The controller monitors the external floor temperature RI1 (set to Zone 2), and controls the heating output relay 1 ON/OFF based on heating setpoint and hysteresis. Zone 2 control output is typically used for second zone, e.g. bathroom, underfloor heating.

The heating setpoint and the control settings are configured in the Maintenance mode.

In Economy mode the Zone 2 heating output operates as in the COMFORT mode. In the FROST MODE the output is OFF, but FROST protection on the floor sensor is active. The frost setpoint is the same as for the Zone 1 (main zone). When in boost mode, the zone output is ON.

Note: If Zone 2 Actuator mode is set to PWM (pulse-width modulation), then Zone 2 uses Triac 2 output for control signal (24Vac switched to 0V). Requires 24Vac power supply.

Humidity Control and Measurement (With RH Option)

The models with RH option have 2%rH accurate humidity sensor for room space humidity measurement. The humidity reading is displayed on the screen and available over the communication network.

The TRT can also operate as a humidifier/dehumidifier when the RH measurement and control option has been fitted. You can set the target humidity setpoint for the humidity control from the configuration menu (or from the front screen if enabled). In humidity control mode when the humidity drops below the Humidity Setpoint, the Relay2 activates. When the humidity increases above the Humidity Setpoint + PB (Hysteresis), the Relay2 switches OFF. In de-humidify control (default) mode the operation is reverse.

Note: To activate the humidity control Relay2 Mode parameter is required to be set to 'Humidity'.

You can activate the Humidity Setpoint to be adjusted from the Home Screen. This is done by enabling Display/Humidity Setpoint parameter. In this mode when pressing the temperature target on the Home Screen, the humidity setpoint is displayed. Now by pressing UP and DOWN arrows it is possible to adjust the humidity setpoint. The display returns automatically after approx. 10 seconds to display the temperature target.



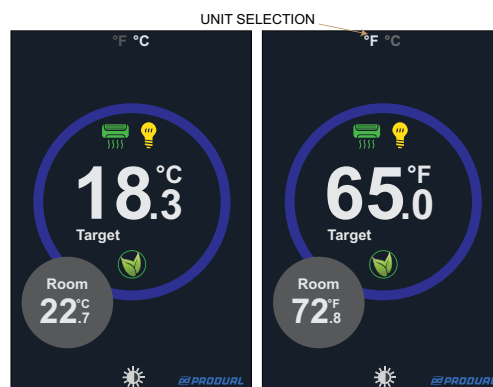
Warning: Lighting Control is not available when the Humidity Control has been activated.

Centigrade to Fahrenheit Display

If Centigrade to Fahrenheit icon has been enabled (parameter System/Show Unit Swap) it is possible on the front screen to change the units by touching this icon.

This option is particularly useful in hospitality applications where the client base is expected to be international.

In addition (from Fw 4.01 onwards) at the commissioning it is possible to select default units from parameter System/Native Units. When changing the Native Units the device carries out Factory Default reload using the selected units (for all relevant settings).



Warning: After changing the Native Units, the controller reloads defaults for ALL PARAMETERS. The Native Unit selection should be done at the start of the commissioning.

ECO Mode

The device can be switched to ECO mode via network, via digital input or via the touchscreen.

To use the touchscreen enter to the FURTHER INFORMATION screen and select the ECO MODE icon. It is possible to set the number of days of ECO mode. The available range is 0-31 days. After setting the ECO mode, the device immediately switches to the ECO mode.

By setting ECO MODE to 0 or just by pressing ENTER button the device switches to permanent ECO MODE. The ECO MODE can be cancelled by pressing the ECO ICON in the front screen.

OFF Mode

The controller can be switched to OFF mode via digital volt-free input (e.g. time clock), via FURTHER SETTINGS screen button or via the communication network (system configuration). The device switches also to OFF mode when the cleaning mode has been activated. When in OFF mode if Zone 1 temperature drops below the Frost Setpoint, the frost protection is activated, the SNOWFLAKE icon is displayed on the screen and both Zone 1 and Zone 2 outputs are switched fully ON. When the temperature exceeds the frost setpoint plus 2 degrees, the frost condition is deactivated.

Boost

The device temperature control outputs (Main Zone Triac1 and Second Zone Relay1) can be switched ON for a timed period (default off) by activating the BOOST function. The BOOST override the automatic temperature control.

Note: The boost function is enabled through the configuration screen.

Cleaning Mode

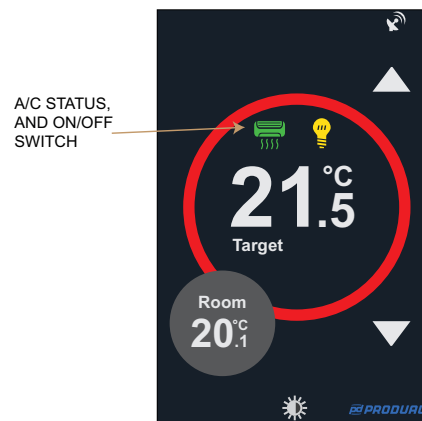
After entering FURTHER INFORMATION screen, by selecting the CLEANING icon, it is possible to activate the cleaning modes. The thermostat will enter a "Clean Screen" state where all touchscreen presses are ignored and 30 second countdown timer is displayed. This allows cleaning of the thermostat itself.

A/C Ventilation Icon and TR2 Output

The device controls the A/C ventilation output Triac 2. The A/C ventilation output is automatically switched ON when device goes to COMFORT mode (e.g. via door card or network transition). In the ECO/OFF mode the ventilation output is as default OFF (configurable).

The ventilation status is showed in the home screen (if the ICON has been enabled). It is also possible to enable/disable the ventilation manually by pressing the icon.

The AC Mode Icon and Operating Modes are changed through the configuration settings. The following options are available.



AC Mode and Operating Mode Setting	Description (Typical Operation)
Disabled	AC Icon not visible to the user. Triac 2 ON in Comfort Mode. Triac 2 OFF in ECO/OFF Modes
Enabled, Comfort ON	AC Icon visible to the user in all modes. Triac 2 ON on transition to Comfort Mode. Triac 2 OFF on transition to ECO/OFF Modes. Manual and Network Overrides active.

AC Mode and Operating Mode Setting	Description (Typical Operation)
Enabled, Comfort and ECO ON	AC Icon visible to the user in all modes. Triac 2 ON on transition to Comfort and ECO Mode. Triac 2 OFF on transition to OFF Mode. Manual and Network Overrides active.

Note: If the Zone 2 Actuator Mode has been set to PWM, the Triac 2 is no longer used to switch ventilation output. The Triac 2 becomes Zone 2 control output.

Lights Enable Icon and Relay 2 Output

The Lights output (Relay 2) is enabled automatically when the controller goes to COMFORT mode.

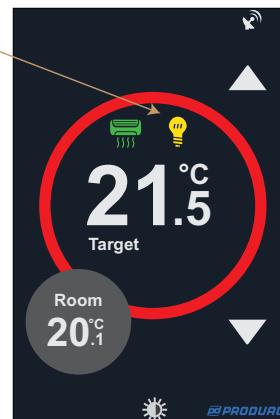
When the controller switches from COMFORT mode to ECO or to FROST mode, the Lights (Relay 2) are automatically switched OFF. There is 30 seconds (adjustable) switch off delay on transition.

The Lights Icon is displayed in the HOME SCREEN (if enabled). By pressing the Lights icon it is possible to manually to switch ON/OFF lights in COMFORT, ECO and OFF modes.

When the Lights icon is pressed the device goes to COUNTDOWN mode for the time set in the Lights Delay Time parameter. In this mode the Lights icon changes colour to brown. If the Lights icon is re-pressed in this mode the countdown is cancelled and the lights are switched ON.

LIGHTS STATUS, AND ON/OFF SWITCH

-  LIGHTS ON
-  COUNT-DOWN MODE
-  LIGHTS OFF



Warning: If Relay2 Mode has been configured for 'Humidity', the Lighting control is no longer available.

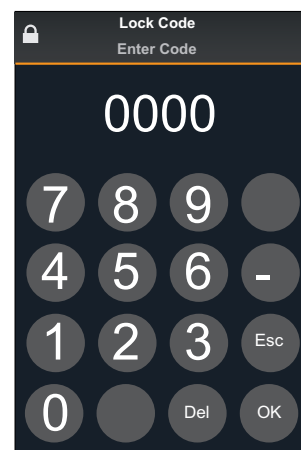
Lock Mode

After entering FURTHER INFORMATION screen, by selecting the LOCK icon it is possible to lock the thermostat. Now by entering the LOCK CODE, the thermostat lock state can be activated.

The lock mode can be configured to work in different ways as described at the below table.

- DISABLED: Lock Mode Icon Not Available
- ON/OFF ONLY: Allows Lights and A/C On/Off Button Only
- ADJUST ONLY: Allows Temperature Adjustment Only
- NO INPUT: All Buttons Locked

If the lock code is set to 0000 (default), there is no need to enter the lock code and the lock entry screen is bypassed.



Lock Mode Options	Icon Active					
	Lock	Up and Down	Boost / OFF	ECO / Cleaning	AC	Lights
DISABLED	NO	YES	YES	YES	YES	YES
ON/OFF ONLY	YES	NO	YES	NO	YES	YES
ADJUST ONLY	YES	YES	NO	NO	NO	NO
NO INPUT	YES	NO	NO	NO	NO	NO

Alarm Display

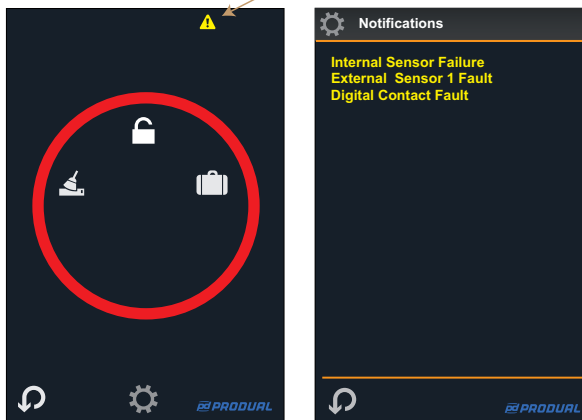
When entering FURTHER INFORMATION AND SETTINGS screen and an alarm is active, select the alarm icon for more information.

The typical alarm reasons are:

- External sensor 1 (Res1) fault (when activated; out of range)
- Built-in sensor fault
- Digital Input Alarm

FURTHER SETTINGS AND INFORMATION

SELECT ALARM ICON FOR MORE INFORMATION



Remote Sensor Rin1 Input

A remote NTC10k3 sensor can be connected to this input to used for different control and display purposes. The options are:-

- CONTROL: Rin1 is used for the main zone temperature control
- OUTSIDE: Rin1 is used to show the Outside Temperature
- SYSTEM: Rin1 is available over the communication network for system purposes only.
- FLOOR CONTROL; Rin1 is used for the second zone temperature control (DEFAULT)

Din Digital Volt-Free Input

The digital volt-free contact can be used to override the device to ECO and FROST modes. The configuration options are:-

- Close for ECO Mode
- Open for ECO Mode (DEFAULT - DOOR CONTACT MODE)
- Close for FROST Mode
- Open for FROST Mode
- Heating/Cooling (Change-Over Configuration)
- Alarm
- Network

"Open For" Configuration - The digital volt-free input can be used to activate ECO or FROST mode when the contact opens. In this mode it can be connected to a window switch, door card switch or PIR sensor. When the device sees transition from closed to open, the operating mode does not change until the countdown timer has expired (DIGITAL INPUT DELAY setting).

"Close For" Configuration - The digital volt-free contact can be linked to e.g. external timer to switch the device to FROST mode during the timed period. When the device sees transition from open (COMFORT) to close (ECO/FROST MODE), the operating mode does not change until the Delay Timer has expired.

Heating/Cooling Change-Over Configuration - The digital input can also be used to override from heating to cooling mode. The device main control zone works in the heating mode when the contact is open, and in the cooling mode when the contact is closed. This configuration does not affect the second zone control.

Alarm Configuration - when the contact closes the "DI Contact Alarm" alarm message is displayed on the screen.

Network option is selected when the digital input is used for monitoring purposes only.

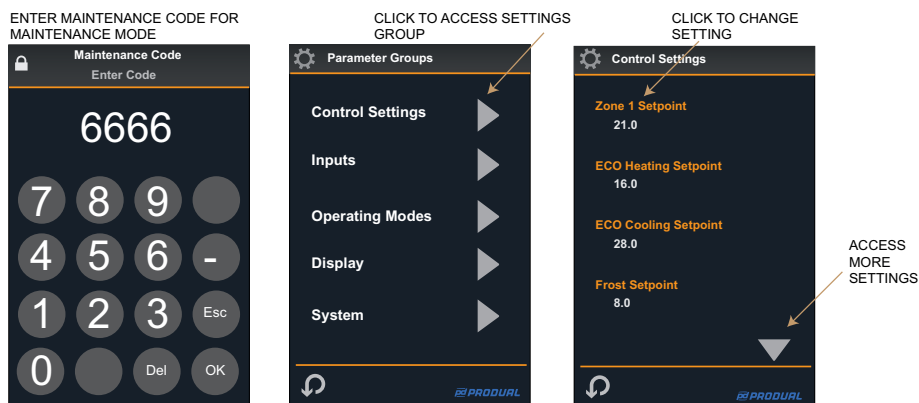
Humidity Measurement (-RH option)

The models with RH option have 2%rH accurate humidity sensor for room space humidity measurement. The humidity reading is displayed on the screen and available over the communication network.

AntiJAM Valve Exercise Function

If the AntiJAM function is enabled the controller monitors for inactivity. If the main zone PWM output has been fully closed or fully open more than the AntiJAM period, the controller will open/close the outputs for a short period of time. The AntiJAM function is enabled through the configuration parameters by selecting the required AntiJAM period by days.

Configuration Parameters



The TRT devices are configured to operate in different modes via the configuration parameters accessible through the maintenance mode.

To enter the maintenance mode click the COG WHEEL icon in the FURTHER SETTINGS SCREEN and enter the maintenance mode password (default 6666).

Note: The maintenance mode password can be changed in the configuration settings. Make sure that you note the new password if changed. If the Maintenance Code is set as 0000, the Maintenance Code entry screen is bypassed (i.e. no protection).

CONTROL SETTINGS		
Parameter Name	Description	Range
Zone 1 Setpoint	Nominal Setpoint for Zone 1 (Main Control)	0.0...95.0°C/°F (Default 21.0°C)
ECO Heating Setpoint	ECO Mode Heating Setpoint	0.0...95.0°C/°F (Default 16.0°C)
ECO Cooling Setpoint	ECO Mode Cooling Setpoint	0.0...95.0°C/°F (Default 28.0°C)
Frost Setpoint	Night Frost Setpoint (OFF Mode)	0.0...95.0°C/°F (Default 8.0°C)
Min Setpoint Adj	Minimum Adjustable Setpoint	0.0...95°C/°F (Default 14.0)
Max Setpoint Adj	Maximum Adjustable Setpoint	0.0...95°C/°F (Default 30.0)
Zone 1 P-Band	Proportional Band for the Main Zone 1 Control (in On/Off mode represents hysteresis)	0.0...95.0 (Default 1.0°C/°F)
Zone 1&2 Integral Time	Integral Action Time for Zones 1 and 2 (PWM MODE)	0..7200 Seconds (Default 0)
Zone 1 Control Type	Main Zone 1 Heating and/or Cooling Control	0 = Heating Control (default) 1 = Cooling Control 2 = Heating/Cooling Change-Over
Zone 2 Setpoint	Zone 2 Heating Setpoint	0.0...95.0°C/°F (Default 27.0°C)
Zone 2 P-Band	Zone 2 Proportional Band (in On/Off mode represents hysteresis)	0.0...95.0 (Default 1.0°C/°F)
Humidity Setpoint	Humidity Control Setpoint	0...99 %rH (Default 50%rH)
Min. Humidity Adj	Minimum Humidity Setpoint Adjustment	0...49 %rH (Default 20%rH)
Max. Humidity Adj	Maximum Humidity Setpoint Adjustment	50...99 %rH (Default 80%rH)
Humidity P-Band	Humidity Control Hysteresis	0...20 %rH (Default 20%rH)
Humidity Mode	Humidity / Dehumidity Control	0 = De-Humidity Control (Default) 1 = Humidity Control

INPUTS & OUTPUTS		
Parameter Name	Description	Range
Zone1 Actuator Mode	Zone 1 (Main) Actuator Operating Mode Note: After changing to PWM mode reset the device by entering and exiting the System menu. The PWM will run on initially for the PWM period.	0 = On/Off NO 1 = On/Off NC 2 = PWM NO 2 = PWM NO
Zone2 Actuator Mode	Zone 2 Actuator Operating Mode Note: After changing to PWM mode reset the device by entering and exiting the System menu. The PWM will run on initially for the PWM period.	0 = On/Off NO 1 = On/Off NC 2 = PWM NO 2 = PWM NO
PWM Period	Actuator PWM Period for the Main Zone (PWM MODE)	0..255 Seconds (Default 30)
Anti-JAM	Valve Exercise	0..14 Days (default 0 = disabled)

INPUTS & OUTPUTS		
Parameter Name	Description	Range
RI1 Mode	Remote Temperature Sensor RI1 Mode	0 = Disabled (Default) 1 = Zone 1 (Main Zone) 2 = Zone 2 3 = Outside Temperature (Display) 4 = Network
Outside Temp Source	Source for the Outside Temperature Display	0 = Built-In Sensor 1 = Network Sensor
Digital Input Mode	Digital Input Operation	0 = Disabled 1 = Close for ECO 2 = Open for ECO 2 = Close for OFF 3 = Open for OFF 4 = Heating / Cooling Mode 5 = DI Contact Alarm 6 = Network
Digital Input Delay	Digital Input Delay Timer (transition from active to non-active)	0..7200 seconds (Default 0s)
Internal Sensor Calibration	Internal Sensor One Point Compensation	-10.0..+10.0 °C/°F
RI1 Calibration	Sensor Connected to RI1 Calibration	-10.0..+10.0 °C/°F
Humidity Calibration	Humidity Calibration	-10.0..+10.0 % rH
Relay 1 Mode	Relay 1 Mode	0 = Zone 2 1 = Zone 1
Relay 2 Mode	Relay 2 Mode Note: Setting Mode to Humidity Disables the Lighting control.	0 = Display Lights (Default) 1 = Humidity

OPERATING MODES		
Parameter Name	Description	Range
Power Up	Power Up Operation	0 = On (Device COMFORT mode when power applied - Default) 1 = OFF (Device in OFF mode when power applied)
Lock Mode	Lock Operation	0 = Disabled (default) 1 = Lights/A/C On/Off Workable Only 2 = Temp Adjust Only Available 3 = No Input - All Buttons Disabled
Lock Code	Lock Mode Password	0000 - 9999 (default 0000)
Boost Time	Boost Mode Running Time	0..480 minutes (Default 0) 0 = Disabled
Lights Delay Time	Delay Time for Lights Switch Off	0..1,800 Seconds (Default 30)
Enable AC	Enable AC Mode Icon and Operating Mode	0 = Disabled (default) 1 = Enabled, Comfort ON 2 = Enabled, Comfort and ECO ON 3 = Network, Icon Only

DISPLAY		
Parameter Name	Description	Range
Brightness	Backlight Brightness	0..20 (default 5)
Display Lights	Enable / Display Lights Icon / Network Variable	0 = Disabled (default) 1 = Enabled
Display Humidity	Enable / Disable Humidity Display (if option fitted)	0 = Disabled 1 = Enabled (default)
Show Swap Units	Enable Centigrade to Fahrenheit Conversion on the Home Screen	0 = Disabled (default) 1 = Enabled

DISPLAY		
Parameter Name	Description	Range
Zone 1 Text	Description for the Zone 1 Sensor (Built-In Sensor / RI1)	1 = Room (Default) 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
Zone 2 Text	Description for the Zone 2 Sensor (RI1) Default; 2 = Floor Note: Disabled removes Zone 2 Text and Measurement from Display	0 = Disabled 1 = Room 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
Zone 3 Text	Description for the Zone 3 Sensor (RI1 / Network Value) Default; 3 = Outside Note: Disabled removes Zone 3 Text and Measurement from Display	0 = Disabled 1 = Room 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
Humidity Setpoint	Enabling Humidity Setpoint Display on the Home Screen	0 = Disabled (default) 1 = Enabled

SYSTEM		
Parameter Name	Description	Range
Address	Modbus Address (Only Modbus versions) BACnet MAC Address (Only BACnet versions)	0..247 (Default 1) 0..127 (Default 1)
Baud Rate	Modbus / BACnet Baud Rate	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600 4 = 76800
Parity	Parity	0 = None (Default) 1 = Odd 2 = Even
Stop Bits	Stop Bits	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
Device ID	BACnet Device ID	0..4,194,303 (Default Auto=651001)
Service Pin	Bacnet Service Pin (when activated the device sends BACnet I-AM message)	0 = Disabled (default) 1 = Enabled
Maintenance Code	Maintenance Mode Password	0000 - 9999 (default 6666)
Staff Code	Staff Page Password - Access Password to Further Settings Screen	0000 - 9999 (default 0000 = disabled)
Language	Default Language for User Screens	0 = English (EN, Default) 1 = Finnish (FI) 2 = Swedish (SE) 3 = Italian (IT) 4 = Dutch (NL) 5 = French (FR)
Screen Refresh Rate	Refresh Rate of the LCD Screen	0 = Fast (default) 1 = Medium 2 = Slow
Native Units (Defaults)	Selects either Fahrenheit / Celsius as Native Units NOTE: RELOADS DEFAULTS	C = Celsius (default) F = Fahrenheit

SYSTEM		
Parameter Name	Description	Range
Reload Default	Reload Default Settings	0 = Off (default) 1 = On
Version	Software Version	x.xx (BACnet/Modbus)

Parameter Storage

The configuration parameters are stored in the non-volatile memory. When the changes are carried out via the display, the parameters are stored in the non-volatile memory when the controller returns to a normal display mode. If the changes are carried out over the network (Modbus or BACnet), then "NonVol Update" register/object is required to be forced on to save the changes. The register will automatically return to normal state.

Modbus Registers

The controller supports the following Modbus registers and function codes. The default communication speed is 9600 bps, 8 data bits, Parity None and 1 Stop Bit. The default Modbus Slave address is 1. The device Parity can be changed between Odd, None and Even. The baud rate is selectable between 9600, 19200, 38400, 57600 and 76800 bps. The table shows the register offsets starting from 0 (0 Base) register address. For example, the Temperature is read from Modbus register 100 using Function Code 04. Some Modbus masters will require one to be added to Modbus registers (i.e. 1 Base). In this case Function Code 04, register 101 needs to be entered.

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 01 - READ COILS FUNCTION CODE 05 - WRITE SINGLE COIL FUNCTION CODE 15 - WRITE MULTIPLE COILS			
100	Night Off Mode Override		0..1	Off - On
101	ECO Mode Override		0..1	Off - On
102	Heating/Cooling Mode (change-over mode)		0..1	0 = Heating, 1 = Cooling
	FUNCTION CODE 02 - READ DISCRETE INPUTS (Add 10,000 for Modicon Addressing)			
100	Digital Input Status		0..1	Off - On
101	Relay1 Output Status		0..1	Off - On
102	Relay2 Output Status		0..1	Off - On
103	Light Switch Status		0..1	Off - On
104	A/C Switch Status		0..1	Off - On
105	Screen Lock Status		0..1	Off - On
106	Boost Status		0..1	Off - On
107	ECO Mode Status		0..1	Off - On
108	Frost Status		0..1	Off - On
109	Triac 1 Status		0..1	Off - On
110	Triac 2 Status		0..1	Off - On
	FUNCTION CODE 04 - READ INPUT REGISTERS (Add 30,000 for Modicon Addressing)			
100	Built-In Temperature Measurement	Signed 16	-400...3020	-40.0...150.0°C (-40.0...302.0°F)
101	External Temperature Measurement (Resistive Input 1)	Signed 16	-400...3020	-40.0...150.0°C (-40.0...302.0°F)
102	Not Applicable - Returns 0			
103	Current Calculated Setpoint for the Main Control Zone (°C)	Signed 16	-400...3020	-40.0...150.0°C (-40.0...302.0°F)
104	Device Current Mode	Unsigned 16	0..3	0 = Comfort 1 = ECO 2 = OFF 3 = Boost
105	Relative Humidity Measurement	Unsigned 16	0..1000	0..100.0 %rH
106	Alarm State	Unsigned 16	0...8	Bit 0 = Internal sensor fault Bit 1 = RI1 fault Bit 2 = DI Alarm
107	Discrete Input Registers (Bit 0 = DI1, Bit1 = Relay1, Bit 2 = Relay 2 etc.)	Unsigned 16	0..65,535	N/A
108	Zone 1 (Main) PWM Output Level	Unsigned 16	0..1000	0..100.0 %
109	Zone 2 PWM Output Level	Unsigned 16	0..1000	0..100.0 %

Register	Parameter Description	Data Type	Raw Data	Range
200	Firmware Versions	Unsigned 16	N/A	N/A
FUNCTION CODE 03 - READ HOLDING REGISTERS (For Modicon Addressing Add 40,000) FUNCTION CODE 06 - WRITE SINGLE HOLDING REGISTER FUNCTION CODE 16 - WRITE MULTIPLE HOLDING REGISTERS				
100	Zone 1 Nominal Setpoint (Main Zone)	Unsigned 16	0...950	0.0...95.0°C/°F (Default 20°C)
101	ECO Heating Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 16°C)
102	ECO Cooling Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 28°C)
103	Frost Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 8°C)
104	Minimum Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 14°C)
105	Maximum Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 30°C)
106	Rin1 Remote Temperature Sensor Mode	Unsigned 16	0..3	0 = Disabled (Default) 1 = Zone 1 (Main Zone) 2 = Zone 2 3 = Outside Temperature (Display) 4 = Network
107	Outside Temperature Source	Unsigned 16	0..1	0 = Built-In Sensor (Default) 1 = Network Sensor
108	Zone 1 Control Type	Unsigned 16	0..2	0 = Heating Control (default) 1 = Cooling Control 2 = Heating/Cooling Change-Over
109	PWM Period	Unsigned 16	0..255	0..255 Seconds (30 = default)
110	Zone 1 Proportional Band	Unsigned 16	0...950	0.0...95.0°C/°F (Default 5.0)
111	Zone 1 & 2 Integral Action Time (PWM)	Unsigned 16	0...7200	0..7,200 Seconds (default 600)
112	Digital Input Mode	Unsigned 16	0..6	0 = Disabled 1 = Close for ECO 2 = Open for ECO 2 = Close for OFF/FROST 3 = Open for OFF/FROST 4 = Heating / Cooling Mode 5 = Alarm 6 = Network
113	Digital Input Delay	Unsigned 16	0..7200	0..7200 seconds (Default 0s)
114	Display Lights Icon	Unsigned 16	0..1	0 = Disabled (default) 1 = Enabled
115	Enable AC Mode Icon and Operating Mode	Unsigned 16	0..2	0 = Icon Disabled (default) 1 = Enabled, Comfort ON 2 = Enabled, Comfort and ECO ON
116	Power Up	Unsigned 16	0..1	0 = Thermostat On when power applied (default) 1 = Thermostat Off when power applied
117	Lock Mode	Unsigned 16	0..4	0 = Lock mode disabled (default) 1 = On/Off workable only 2 = Temp settings only available 3 = All buttons disabled
118	Show Swap Temperature Units Selection	Unsigned 16	0..1	0 = Disabled (default) 1 = Enabled
119	Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 °C/°F
120	RI1 Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 °C/°F
121	Outside Air Temperature - Network Write	Signed 16	-580...1220	-58.0...122.0°C/°F (Default 0.0)
122	Humidity Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 %rH
123	Display Humidity	Unsigned 16	0..1	0 = Disabled 1 = Enabled (default)

Register	Parameter Description	Data Type	Raw Data	Range
124	Boost Mode Time	Unsigned 16	0...480	0..480 minutes (Default 0) 0 = Disabled
125	Backlight	Unsigned 16	0..20	0..20 (default 5)
126	Not applicable			
127	Lock Mode Password	Unsigned 16	0..9999	0000...9999
128	Maintenance Mode Password	Unsigned 16	0..9999	0000...9999
129	Override A/C	Unsigned 16	0..2	0 = None (default) 1 = Override On 2 = Override Off
130	Override Lights	Unsigned 16	0..2	
131	Override Lock Mode	Unsigned 16	0..2	
132	Zone 2 Temperature Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 27.0°C)
133	Zone 2 Proportional Band	Unsigned 16	0...950	0.0...95.0°C/°F (Default 1.0)
134	Relay 1 Network Override (Zone 2) Note: Relay Direction Mode (N/O, N/C) is applied after this override)	Unsigned 16	0..2	0 = No Override (Default) 1 = Override On 2 = Override Off
135	Relay 2 Network Override (Lights)	Unsigned 16	0..2	
136	Triac 1 Network Override (Zone 1)	Unsigned 16	0..2	
137	Triac 2 Network Override (Ventilation)	Unsigned 16	0..2	
138	Zone 1 (Main) Actuator Mode	Unsigned 16	0..3	0 = On/Off N/O (Default) 1 = On/Off N/C 2 = PWM N/O 3 = PWM N/C
139	Zone 2 Actuator Mode	Unsigned 16	0..3	
140	Anti-JAM Timeout	Unsigned 16	0..14	0..14 Days 0 = Disabled (Default)
141	Staff Code	Unsigned 16	0..9999	0000...9999
142	Language	Unsigned 16	0..2	0 = English (Default) 1 = Finnish 2 = Swedish
143	Lights Delay Time	Unsigned 16	0...1800	0..1800 seconds (Default 30)
144	Zone 1 Text (Room Sensor Description)	Unsigned 16	1..15	1 = Room (Default) 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
145	Zone 2 Text (Floor Sensor Description) Default: 2 = Floor Note: Disabled removes the text and the Zone 2 measurement from the display.	Unsigned 16	0..15	0 = Disabled 1 = Room 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
146	Zone 3 Text (Outside / Network Sensor Description) Default: 3 = Outside Note: Disabled removes the text and the Zone 3 measurement from the display.	Unsigned 16	0..15	
147	Humidity Setpoint	Signed 16	0..99	0..99 %rH
148	Min. Humidity Adjustment	Signed 16	0..49	0..49 %rH

Register	Parameter Description	Data Type	Raw Data	Range
149	Max. Humidity Adjustment	Signed 16	50..99	50..99 %rH
150	Humidity PB (Humidity Hysteresis)	Signed 16	0..20	0..20 %rH
151	Humidity Control Mode	Signed 16	0..1	0 = De-humidity (default) 1 = Humidity
152	Show Front Screen Humidity Setpoint	Signed 16	0..1	0 = Disabled (default) 1 = Enabled
153	Relay 1 Mode	Signed 16	0..1	0 = Zone 2 1 = Zone 1
154	Relay 2 Mode	Signed 16	0..1	0 = Display Lights (Default) 1 = Humidity
200	Modbus Address	Unsigned 16	0..247	0..247 (Default 1)
201	Modbus Baud Rate	Unsigned 16	0...3	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600
202	Modbus Parity	Unsigned 16	0...2	0 = None (Default) 1 = Odd 2 = Even
203	Stop Bits	Unsigned 16	0...1	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
300	Force Reset	Unsigned 16	0..1	0 = Normal 1 = Force Reset
301	Non Volatile Memory Update	Unsigned 16	0..1 Note 3	0 = Normal 1 = Update
303	Force Factory Defaults	Unsigned 16	0..1	0 = Normal 1 = Force Defaults

BACnet Standard Object Types Supported

No dynamic Creation or Deletion supported. Objects, and object instances, are assigned to fixed functions within the proprietary control application of the product as follows

Object	Number Of Instances	Instance Assignments
Device Object	1	
Analog Input	8	AI(0) – Zone 1 Temp AI(1) - Zone 3 Temp (Outside) AI(2) - Zone 2 Temp AI(3) - Setpoint (Calculated) AI(4) - Humidity AI(5) – RI_1 AI(6) - Zone 1 PWM Level AI(7) - Zone 2 PWM Level
Analogue Value	9	AV(0) - Zone 1 Setpoint AV(1) – ECO Heating Setpoint AV(2) – ECO Cooling Setpoint AV(3) – Frost Setpoint AV(4) - Zone 1 P-Band AV(5) – Zone 2 Setpoint AV(6) – Zone 2 P-Band AV(7) – Brightness (LCD) AV(8) - Network Temp.
Binary Input	2	BI(0) – DI_1 (Digital Input 1) BI(1) – Boost Status

Object	Number Of Instances	Instance Assignments
Binary Output	11	BO(0) – Relay1 (Output) BO(1) – Relay2 (Output) BO(2) – Triac 1 (Output) BO(3) – Triac 2 (Output) BO(4) - OFF Status BO(5) - ECO Status BO(6) – Lights BO(7) – A/C BO(8) – Lock Screen BO(9) – Heating/Cooling Mode BO(10) - Non Volatile Update
MutliState Input	2	MSI(0) - Device Mode (1=Comfort, 2=ECO, 3=OFF) MSI(1) - Alarm

App_Config Object

NOTE: Application Configuration Object exposes the configuration parameters over the BACnet. However please check if your BACnet client can support Proprietary Object types to be able to access these parameters. Alternatively set the configuration parameters through the TRT touchscreen.

	Property Name /ID	Attributes	Range	Default
Required Object Properties	Object Identifier	R		proprietary-128
	Object Name	R/W		"App_Config"
	Object Type	R		proprietary-128
Optional Properties	None			

	Property ID	Description	BACnet Data Type	Range
Proprietary Properties	30106	Alarm State	REAL	N/A
	40100	Zone 1 Nominal Setpoint	REAL	0.0...95.0°C/°F (Default 16°C)
	40101	ECO Heating Setpoint	REAL	0.0...95.0°C/°F (Default 28°C)
	40102	ECO Cooling Setpoint	REAL	0.0...95.0°C/°F (Default 8°C)
	40103	Frost Setpoint	REAL	0.0...95.0°C/°F (Default 14°C)
	40104	Minimum Setpoint	REAL	0.0...95.0°C/°F (Default 30°C)
	40105	Maximum Setpoint	REAL	0.0..20.0°C/°F (Default 1.0°C)
	40106	Rin1 Remote Temperature Sensor Mode	Unsigned	0 = Disabled (Default) 1 = Zone 1 (Main Zone) 2 = Zone 2 3 = Outside Temperature (Display) 4 = Network
	40107	Outside Temperature Source	Unsigned	0 = Built-In (Default) 1 = Network Sensor
	40108	Zone 1 Control Type	Unsigned	0 = Heating Control (default) 1 = Cooling Control 2 = Heating/Cooling Change-Over
	40109	PWM Period	Unsigned	0..255 seconds (Default 30s)
	40110	Zone 1 Proportional Band	REAL	0.0...95.0°C/°F (Default 5.0)
	40111	Zone 1 & 2 Integral Action Time (PWM Mode)	Unsigned	0..7,200 Seconds (default 600)

	40112	Digital Input Mode	Unsigned	0 = Disabled 1 = Close for ECO 2 = Open for ECO 3 = Close for OFF 4 = Open for OFF 5 = Heating / Cooling Mode 6 = Alarm 7 = Network
	40113	Digital Input Delay	Unsigned	0..7200 seconds (Default 0s)
	40114	Display Lights Icon	Unsigned	0 = Disabled (default) 1 = Enabled
	40115	Enable AC Mode Icon and Operating Mode	Unsigned	0 = Icon Disabled (default) 1 = Enabled, Comfort ON 2 = Enabled, Comfort and ECO ON
	40116	Power Up	Unsigned	0 = Thermostat On when power applied (default) 1 = Thermostat Off when power applied
	40117	Lock Mode	Unsigned	1 = Lock mode disabled (default) 2 = On/Off workable only 3 = Temp settings only available 4 = All buttons disabled
	40118	Show Swap Temperature Units Selection	Unsigned	0 = Disabled (default) 1 = Enabled
	40119	Internal Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40120	RI1 Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40122	Humidity Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40123	Display Humidity	Unsigned	0 = Disabled 1 = Enabled (default)
	40124	Boost Mode Time	Unsigned	0..480 minutes (Default 0)
	40125	Backlight	Unsigned	0..20 (default 5)
	40127	Lock Mode Password	Unsigned	0000...9999
	40128	Maintenance Mode Password	Unsigned	0000...9999
	40132	Zone 2 Setpoint	REAL	0.0...122.0°C/°F (Default 30.0°C)
	40133	Zone 2 Proportional Band	REAL	0.0...95.0°C/°F (Default 5.0)
	40138	Zone 1 (Main) Actuator Mode	Unsigned	0 = On/Off N/O (Default)
	40139	Zone 2 Actuator Mode	Unsigned	1 = On/Off N/C 2 = PWM N/O 3 = PWM N/C
	40140	Anti-JAM Timeout	Unsigned	0..14 Days 0 = Disabled (Default_
	40141	Staff Access Code	Unsigned	0000...9999
	40142	Language	Unsigned	0 = English 1 = Finnish 2 = Swedish
	40143	Lights Delay Time	Unsigned	0000...1800 (Default 30)
	40144	Zone 1 Text (Room Sensor Description)	Unsigned	1 = Room (Default) 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool

	40145	Zone 2 Text (Floor Sensor Description) Default: 2 = Floor Note: Disabled removes the text and the Zone 2 measurement from the display.	Unsigned	0 = Disabled 1 = Room 2 = Floor 3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
	40146	Zone 3 Text (Outside / Network Sensor Description) Default: 3 = Outside	Unsigned	
	40147	Humidity Setpoint	Unsigned	0..99 %rH
	40148	Min. Humidity Adjustment	Unsigned	0..49 %rH
	40149	Max. Humidity Adjustment	Unsigned	50..99 %rH
	40150	Humidity PB (Humidity Hysteresis)	Unsigned	0..20 %rH
	40151	Humidity Control Mode	Unsigned	0 = De-humidity (default) 1 = Humidity
	40152	Show Front Screen Humidity Setpoint	Unsigned	0 = Disabled (default) 1 = Enabled
	40153	Relay 1 Mode	Unsigned	0 = Zone 2 1 = Zone 1
	40200	MAC ID	Unsigned	0..127 (Default 1)
	40201	BACnet Baud Rate	Unsigned	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600
	40300	Force Reset	Unsigned	0 = Normal 1 = Force Reset
	40301	Non Volatile Memory Update	Unsigned	0 = Normal 1 = Update
	40303	Force Factory Defaults	Unsigned	0 = Normal 1 = Force Defaults

NOTE:Information is subject to change without prior notice.

Dimensions

